

# Section 1

## Introduction

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The San Diego County Water Authority's (Water Authority) 2010 Urban Water Management Plan (2010 Plan) has been prepared in accordance and compliance with the Urban Water Management Planning Act (Act) (Water Code §10610 through 10656) and includes the conservation measures, programs and policies required by Water Code §10608.36.

Urban water suppliers are required by the Act to update their Urban Water Management Plan (UWMP) and submit a complete version to the California Department of Water Resources (DWR) every five years. The plan serves as the Water Authority's long-term planning document to ensure a reliable water supply for the region. In accordance with its Administrative Code, the Water Authority will also prepare annual water supply reports commencing in 2012 to provide updated information on development of local and imported water supplies. New for the 2010 Plan are the following sections: the Water Authority's climate change mitigation and adaptation strategies in **Section 1.7.3**; measures, programs, and policies to achieve per capita water use targets as required by Water Code § 10608.36 at both the retail agency level and the Water Authority as a wholesale provider in **Sections 1.2, 2.4.2, and 3**; a discussion on the Water Authority's Integrated Regional Water Management Plan in **Section 8**; the Water Authority's Scenario Planning process to deal with future uncertainties in long-range water planning in **Section 10**; and details on the 2007-2011 water shortage in **Section 11**.

The Water Authority's mission is to provide a safe and reliable supply of water to its member agencies serving the San Diego region. This 2010 Plan identifies a diverse mix of water resources projected to be developed over the next 25 years to ensure long-term water supply reliability for the region.

Since adopting the Updated 2005 Urban Water Management Plan (2005 Plan), the Water Authority and its member agencies have made great strides in conserving and diversifying its supplies. With an aggressive conservation program, the region has conserved an average of 53,605 acre-feet per year (AF/YR) of water over the last five years when compared to the benchmark year of demand in 1991. Conserved agricultural transfer water from the Imperial Valley will provide 200,000 AF/YR by 2021. The Water Authority has contracted rights to 77,700 AF/YR of conserved water from projects to line the All-American and Coachella Canals. Deliveries of conserved water from the Coachella Canal reached the region in 2007, and deliveries from the All-American Canal reached the region in 2010.

Developing these supplies is key to diversifying the region's supply sources, but other factors are also important, such as member agencies implementing and managing local resources. Indeed, local surface water, groundwater, and recycled water are all important elements of a diverse water supply portfolio. Also, the Metropolitan Water District of Southern California (Metropolitan) must continue to provide a reliable supply of imported water to the region. The Water Authority, its member agencies, and Metropolitan should work together to ensure a diverse and reliable supply for the region.

## 1.1 California Urban Water Management Planning Act

The Act requires all urban water suppliers in the state to prepare UWMPs and update them every five years. The Water Authority utilized DWR's *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 UWMP* in preparation of this Plan.

Major amendments made to the Act since preparation of the Water Authority's 2005 Plan include the following:

- Water Code Section 10631.1 requires a plan by retail water suppliers to include water use projections for single- and multi-family residential housing needed for lower income and affordable households, to assist with compliance with the existing requirement under Section 65589.7 of the Government Code, that suppliers grant a priority for the provision of service to housing units affordable to lower income households.
- Water Code Section 10621(b) clarifies that every urban water supplier preparing a plan must give at least 60 days advanced notice to any city or county prior to the public hearing on the plan within which the supplier provides water supplies to allow for consultation on the proposed plan.
- Water Code Section 10631(j) deems water suppliers that are members of the California Urban Water Conservation Council (CUWCC) and comply with the Memorandum of Understanding (MOU), as it may be amended, to be in compliance with the requirement to describe the supplier's water demand management measures in its UWMP.
- Water Code Section 10631.7 required DWR<sup>1</sup>, in consultation with the CUWCC, to convene a technical panel, no later than January 1, 2009, to provide information and recommendations to DWR and the Legislature on new demand management measures, technologies, and approaches. The panel and DWR were to report to the Legislature on their findings no later than January 1, 2010 and each five years thereafter;
- Water Code Section 10633(d) clarifies that the "indirect potable reuse" of recycled water should be described and quantified in the plan, including a determination regarding the technical and economic feasibility of serving those uses.
- Water Code Section 10644(c) requires DWR to recognize exemplary efforts by water suppliers by obligating DWR to identify and report to the technical panel, described above, and "exemplary elements" of individual water suppliers' plans, meaning any water demand management measures adopted and implemented by specific urban water suppliers that achieve water savings significantly above the levels required to meet the conditions to state grant or loan funding.

Water Code Section 10631.5 was amended to address conditions of eligibility for grants or loans from DWR. DWR will consider whether the urban water supplier has submitted an updated plan when determining eligibility for funds made available pursuant to any program administered by the department.

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<sup>1</sup> Due to subsequent changes in the law (see Section 1.2 on Senate Bill 7), DWR has not yet convened this technical panel or submitted a report to the Legislature.

According to Water Code Section 10610.2(2), “[t]he conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.” **Appendix A** contains the text of the Act.

## 1.2 Senate Bill 7 of the Seventh Extraordinary Session of 2009

In addition to changes in the Act, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SBX7-7, on November 10, 2009, which became effective February 3, 2010. This new law was the water conservation component to the Delta legislation package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. The law requires each urban retail water supplier to develop urban water use targets to help meet the 20 percent goal by 2020, and an interim water reduction target by 2015.

Urban retail water suppliers must include in their 2010 plans the following information from the bill’s target setting process: (1) baseline daily per capita water use; (2) urban water use target; (3) interim water use target; (4) compliance daily per capita water use, including technical bases and supporting data for those determinations. An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan. (Water Code Section 10608.20.) Wholesale water suppliers must include in their 2010 Plans an assessment of their present and proposed future measures, programs and policies to help retail agencies achieve their water use reduction targets. (Water Code Section 10608.36.) **Appendix A** also contains the text of SBX7-7.

## 1.3 Senate Bills 610 and 221

Water Code Sections 10910 through 10914 and Government Code Sections 65867.5, 66455.3, and 66473.7 (commonly referred to as SB 610 and SB 221) amended state law to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 requires that the water purveyor of the public water system prepare a water supply assessment to be included in the environmental documentation of certain large proposed projects. SB 221 requires affirmative written verification from the water purveyor of the public water system that sufficient water supplies are available for certain large residential subdivisions of property prior to approval of a tentative map.

Section 4, “San Diego County Water Authority Supplies,” and Appendix E of the 2010 Plan contains documentation on the existing and planned water supplies being developed by the Water Authority. This documentation may be used by the Water Authority’s member agencies in preparing the water supply assessments and written verifications required under state law. Specific documentation on member agency supplies and Metropolitan supplies may be found in their respective plans.

## 1.4 Water Authority's 2010 Plan Preparation and Implementation

To adequately demonstrate regional water supply reliability over the next 25 years, the 2010 Plan quantifies the regional mix of existing and projected local and imported supplies necessary to meet future retail demands within the Water Authority's service area. Although the 2010 Plan includes specific documentation regarding development of the Water Authority's supplies, the plans submitted by the member agencies and Metropolitan will provide details on their supplies that contribute to the diversification and reliability of supplies for the San Diego region.

Reasonable consistency among the plans of Metropolitan, Water Authority, and its member agencies' plans is important to accurately identify the projected supplies available to meet regional demands. In order to facilitate coordination within the Water Authority's service area, the Water Authority formed an Urban Water Management Plan Working Group made up of staff from the Water Authority and its member agencies. This group provided a forum for exchanging demand and local supply information. The Water Authority further coordinated its efforts by working with the appropriate wastewater agencies. These agencies helped prepare the water recycling element of the 2010 Plan, which describes the wastewater treatment requirements and water recycling potential. In addition, Water Authority staff participated in Metropolitan's Regional Urban Water Management Plan member agency coordination meeting to discuss and share information pertaining to demands and supplies within their service areas. The Water Authority further coordinated with Metropolitan regarding projected needs for imported water deliveries, and provided Metropolitan with a copy of the draft 2010 Plan. The Water Authority participated in DWR hosted webinars on November 30, 2010, and a special workshop on March 7, 2011, to review the requirements of the Act.

An administrative draft of the Water Authority's 2010 Plan was distributed to the Water Authority's member agencies for technical review, and their comments were incorporated into the public review draft 2010 Plan prior to release. Providing member agencies with an administrative draft Plan, which included water supply projections, satisfies Water Code Section 10631(k).

In accordance with the Act, the Water Authority notified the land use jurisdictions within its service area 60 days prior to a public hearing that it was preparing a 2010 Plan (Water Code Section 10635(b)). In addition, the Water Authority encouraged active involvement within its service area prior to and during preparation of the draft Plan (Water Code Section 10642). The public review draft of the 2010 Plan was distributed to the Water Authority's Board of Directors and public for review and comment on May 6, 2011. The public distribution list included entities such as the San Diego Regional Chamber of Commerce, San Diego County Taxpayer's Association, Sierra Club, San Diego County Farm Bureau, County of San Diego, and cities within the Water Authority's service area. The 2010 Plan was available during public review at the Water Authority's office and on the Water Authority's internet homepage at [www.sdcwa.org](http://www.sdcwa.org). The deadline for receipt of comments on the draft 2010 Plan was June 6, 2011. A public hearing to receive comments on the draft 2010 Plan was held on May 26, 2011. Notice of the Public Hearing was published in two separate publications of the San Diego Union-Tribune, the newspaper designated by the Water Authority for publications of notices, as required by Government Code Section 6066 and Water Code Section 10642. The Water Authority reviewed all of the comments received and revised the plan accordingly. On June 23, 2011, the Water Authority's Board of Directors adopted the 2010 Plan. The Water Authority submitted a copy of the adopted 2010 Plan to DWR, the California State Library, the County of San Diego, and the cities within the Water Authority's service area within 30 days of adoption (Water Code Section 10644 (a)). In

addition, a copy of the adopted 2010 Plan is available for review at the Water Authority's office during normal business hours, and a copy of the adopted plan has been posted on the Water Authority's website at [www.sdcwa.org/2010-urban-water-management-plan](http://www.sdcwa.org/2010-urban-water-management-plan) (Water Code Section 10645). A copy of the resolution adopting the 2010 Plan, along with copies of notifications, mailing lists, and other Water Authority 2010 Plan implementation documents, are provided in **Appendix B**.

DWR prepared a checklist of items based on the Act that must be addressed in an agency's plan. This checklist allows an agency to identify where in its plan it has addressed each item. The Water Authority has completed the checklist, referencing the sections and appendices included in the 2010 Plan. The completed checklist is included in **Appendix C**.

## 1.5 History and Description of the Water Authority

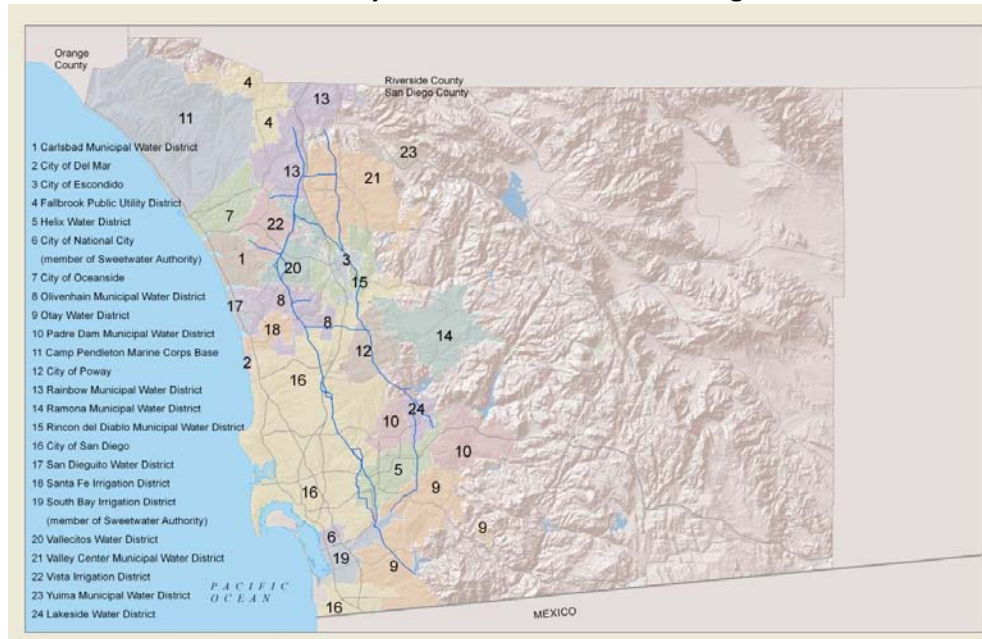
### 1.5.1 History

The Water Authority was established pursuant to legislation adopted by the California State Legislature in 1943 to provide a supplemental supply of water as the San Diego region's civilian and military population expanded to meet wartime activities. Because of the strong military presence, the federal government arranged for supplemental supplies from the Colorado River in the 1940s. In 1947, water began to be imported from the Colorado River via a single pipeline that connected to Metropolitan's Colorado River Aqueduct (CRA) located in Riverside County. To meet the water demand for a growing population and economy, the Water Authority constructed four additional pipelines between the 1950s and early 1980s that are all connected to Metropolitan's distribution system and deliver water to San Diego County. The Water Authority is now the county's predominant source of water, supplying from 75 to 95 percent of the region's needs depending upon weather conditions and yield from surface, recycled, and groundwater projects.

### 1.5.2 Service Area

The Water Authority's boundaries extend from the border with Mexico in the south, to Orange and Riverside counties in the north, and from the Pacific Ocean to the foothills that terminate the coastal plain in the east. With a total of 951,000 acres (1,486 square miles), the Water Authority's service area encompasses the western third of San Diego County. Figure 1-1 shows the Water Authority's service area, its member agencies, and aqueducts (shown as blue lines).

**Figure 1-1**  
**Water Authority Service Area and Member Agencies**



### 1.5.3 Member Agencies

The Water Authority's 24 member agencies purchase water from the Water Authority for retail distribution within their service territories. A 36-member Board of Directors (Board) comprised of member agency representatives governs the Water Authority. The member agencies' six cities, five water districts, eight municipal water districts, three irrigation districts, a public utility district, and a federal military reservation have diverse and varying water needs.

In terms of land area, the city of San Diego is the largest member agency with 210,726 acres. The smallest is the city of Del Mar, with 1,159 acres. Some member agencies, such as the cities of National City and Del Mar, use water almost entirely for municipal and industrial purposes. Others, including Valley Center, Rainbow, and Yuima Municipal Water Districts, deliver water that is used mostly for agricultural production.

## 1.6 Water Authority Physical Water Delivery System

The Water Authority was organized for the primary purpose of supplying imported water to San Diego County for wholesale distribution to its member agencies. These imported water supplies consist of water purchases from Metropolitan, core water transfers from Imperial Irrigation District (IID) and canal lining projects that are wheeled through Metropolitan's conveyance facilities, and spot water transfers that are pursued on an as-needed basis to offset reductions in supplies from Metropolitan. The largest single-year of imported water sales recorded by the Water Authority was 661,300 AF in fiscal year 2007.

## 1.6.1 Aqueduct System

Imported water supplies are delivered to the Water Authority member agencies through a system of large-diameter pipelines, pumping stations, and reservoirs. The pipelines deliver supplies from Metropolitan are divided into two aqueduct alignments, both of which originate at Lake Skinner in southern Riverside County and run in a north to south direction through the Water Authority service area. Metropolitan's ownership of these pipelines extends to a "delivery point" six miles into San Diego County. From there, Pipelines 1 and 2 comprise the First San Diego Aqueduct, which reaches from the delivery point to the San Vicente Reservoir. These two pipelines share five common tunnels and operate as a single unit to provide 180 cubic feet per second (cfs) of conveyance capacity. Pipelines 3, 4, and 5 form the Second San Diego Aqueduct. These pipelines, which are located several miles to the west of the First San Diego Aqueduct, have delivery point capacities as follows: Pipeline 3 provides 280 cfs; Pipeline 4 provides 470 cfs; and Pipeline 5 provides 500 cfs.

In addition to the above north-south pipelines, there are several east-west pipelines that extend service to multiple member agencies. A listing of the pipelines owned and operated by the Water Authority is provided in Table 1-1, with the pipeline locations shown in Figure 1-1.

**Table 1-1. Water Authority Pipelines**

Pipelines	Length (miles)	Diameter (in)
<u>First San Diego Aqueduct:</u>		
Pipeline 1 and Pipeline 2	64.4	48-72
La Mesa-Sweetwater Extension	16.4	18-42
Moreno-Lakeside Pipeline	4.5	54-60
<u>Second San Diego Aqueduct:</u>		
Pipeline 3	57.0	66-75
Pipeline 4	75.0	69-108
Pipeline 5	33.3	96-108
Crossover Pipeline	7.5	66
North County Distribution Pipeline	4.5	72
Tri-Agencies Branch Pipeline	6.4	21-42
Ramona Pipeline	7.2	36-57
Valley Center Pipeline	4.5	66
Olivenhain Pipeline	4.5	78
Olivenhain-Hodges Pipeline	1.5	120

Although most of the water conveyed through the aqueduct system is by gravity flow, the Water Authority also maintains several pumping stations that enhance the operational flexibility of the pipeline system to meet daily, seasonal, and emergency needs. The Water Authority-owned pump stations are listed in Table 1-2.

Three of the water pump stations are for untreated water and are sized to protect the region from potential disruptions of imported water supplies. If a supply disruption occurs, the untreated water pump stations will deliver emergency water supplies from newly expanded or existing local storage reservoirs. For more information on emergency facilities and a description of the Emergency Storage Project (ESP), please refer to **Section 11.1.2**.

At other times, except for the Miramar Pump Station, all the Water Authority–owned pumping stations can be used to move water supplies into and out of storage reservoirs to meet seasonal delivery needs and to augment daily supplies to the member agencies. The Miramar Pump Station is mainly used to deliver treated water via the aqueduct system from the city’s Miramar Water Treatment Plant to city service connections south of the treatment plant.

**Table 1-2. Water Authority Pump Stations**

Pump Stations	Capacity(cfs)
Escondido Pump Station	20
Valley Center Pump Station	20
Miramar Pump Station	85
Olivenhain Pump Station	314
San Vicente Pump Station	444
Olivenhain-Hodges Pumped Storage <sup>1</sup>	760

<sup>1</sup> Under construction

## 1.6.2 Storage Facilities

Storage facilities are used by the Water Authority to both manage daily operations and provide reserves for seasonal, drought, and emergency storage needs. System Regulatory Storage facilities, which consist of enclosed reinforced concrete storage tanks, are available to manage the daily balance of treated and untreated water deliveries. System Regulatory Storage within the aqueduct system currently totals 56 million gallons, with the bulk of this amount in storage tanks located in Twin Oaks Valley and the Mission Trail Regional Park.

Water Authority seasonal, drought, and emergency storage capacity currently includes 24,300 AF of in-region surface water storage at the Olivenhain Reservoir and 70,000 AF of out-of-region leased groundwater storage in the San Joaquin Valley. The groundwater storage includes 30,000 AF of storage and capacity rights acquired in June 2008 in the Semitropic Water Bank, and 40,000 AF of storage provided by the Semitropic-Rosamond Water Bank Authority that was acquired in August 2008.

As part of its ESP, the Water Authority is set to significantly increase its in-region surface water storage capacity. Upon completion of the San Vicente Dam Raise (estimated completion 2013) and the Olivenhain-Hodges Pumped Storage project (estimated completion 2011), surface water storage capacity will increase to a total 192,000 AF. Of this amount, a rolling two month average of consumptive demand is considered emergency storage, which will be available to offset complete loss of imported water supplies from Metropolitan during an extended shutdown or outage of the aqueduct system. The balance of the in-region storage is for carryover, seasonal, or operational storage needs. Carryover storage helps to ensure supply reliability for the region during periods of potential shortages resulting from drought conditions and when pumping restrictions may impact deliveries from Metropolitan and the State Water Project.

Until the San Vicente and Olivenhain-Hodges storage projects are complete, and as a response to recent drought conditions and State Water Project pumping restrictions, the Water Authority entered into short-term agreements with the Sweetwater Authority and the city of San Diego giving it the right to use available storage space within local reservoirs. As of January 2011, the Water Authority had approximately 40,000 AF of carryover storage into Sweetwater and city of San Diego



reservoirs. When the construction is complete on the San Vicente Dam Raise, the Water Authority will maintain its in-region carryover storage in San Vicente Reservoir.

### 1.6.3 Water Treatment

Up until 2008, the Water Authority purchased its treated water supplies from Metropolitan and from member agencies that own and operate local water treatment plants. As early as 2001, the supplies from Metropolitan were being constrained by increasing treated water demands on the Metropolitan system and insufficient treated water pipeline conveyance capacity. As a result, in June 2004, the Water Authority began construction of the 100 million gallons per day (MGD) Twin Oaks Valley Water Treatment Plant (WTP). This WTP was completed and placed in service in April 2008, and now produces high-quality drinking water serving mainly northern San Diego County.

In addition to the Twin Oaks Valley WTP, the Water Authority entered into an agreement with the Helix Water District to purchase 36 MGD of treatment capacity from the R.M. Levy WTP. Water from the Levy plant supplements treated water service to eastern San Diego County. The balance of treated water supplies comes from member agency owned and operated water treatment plants. A list of all in-region water treatment plants is shown in Table 1-3.

**Table 1-3. In-Region Treatment Plant Capacity**

Member Agency	Water Treatment Plant	Capacity (MGD)
Escondido, city of/Vista Irrigation District	Escondido/Vista	65
Helix Water District	Levy	106
Olivenhain Municipal Water District	Olivenhain	34
Oceanside, city of	Weese	25
Poway, city of	Berglund	24
Ramona Municipal Water District	Bargar	4
San Diego, city of	Alvarado	120
San Diego, city of	Miramar	140
San Diego, city of	Lower Otay	40
San Diego County Water Authority	Twin Oaks Valley	100
San Dieguito Water District/Santa Fe Irrigation District	Badger	40
Sweetwater Authority	Perdue	30
<b>Total In-Region Treatment Plant Capacity</b>		<b>728</b>

### 1.6.4 Capital Improvement Program

The Water Authority's Capital Improvement Program (CIP) can trace its beginnings to a report approved by the Board in 1989 entitled, *The Water Distribution Plan, a Capital Improvement*

*Program through the Year 2010.* The Water Distribution Plan included ten projects designed to increase the capacity of the aqueduct system, increase the yield from existing water treatment plants, obtain additional supplies from Metropolitan, and increase the reliability and flexibility of the aqueduct system. Since that time the Water Authority has made numerous additions to the list of projects included in its CIP as the region's infrastructure needs and water supply outlook have changed.

The current list of projects included in the CIP is based on the results of planning studies, including the 2005 UWMP and the 2002 Regional Water Facilities Master Plan. These CIP projects, which are most recently described in the Water Authority's *Adopted Multi-Year Budget, Fiscal Years 2010 and 2011*, include 47 projects valued at \$3.85 billion. These 47 CIP projects are designed to meet projected water supply and delivery needs of the member agencies through 2030. The projects include a mix of new facilities that will add capacity to existing conveyance, storage, and treatment facilities, as well as repair and replace aging infrastructure. Table 1-4 provides an overview of the CIP based on the following categories:

- **Asset Management** – The primary components of the asset management projects include relining and replacing existing pipelines and updating and replacing metering facilities.
- **New Facilities** – These projects will expand the capacity of the aqueduct system, complete the projects required under the Quantification Settlement Agreement (QSA), and evaluate new supply opportunities.
- **Emergency Storage Project** – Projects remaining to be completed under the ongoing ESP include the San Vicente Dam Raise, the Lake Hodges projects, and a new pump station to extend ESP supplies to the northern reaches of the Water Authority service area.
- **Other Projects** – This category includes out-of-region groundwater storage, increased local water treatment plant capacity, and projects that mitigate environmental impacts of the CIP.

**Table 1-4. CIP Cost Summary by Category**

Project Category	Project Cost <sup>1</sup>
Asset Management	\$864,443,000
New Facilities	\$1,538,693,000
Emergency Storage Project	\$1,266,411,000
Other Projects	<u>\$95,411,000</u>
Subtotal – Active and Future Projects	\$3,764,958,000
Completed Projects	<u>\$84,025,500</u>
Total for Capital Improvement Program	\$3,848,983,500

<sup>1</sup> Source: Adopted Multi-Year Budget, Fiscal Years 2010 and 2011

## 1.6.5 Hydroelectric Facilities

The Water Authority has long supported efforts to develop renewable energy resources that are compatible with water operations. The Water Authority's in-line conduit hydroelectric facilities at Alvarado, Miramar, and Rancho Peñasquitos are able to generate electricity from the available elevation gradient in the aqueduct system to produce an environmentally friendly, clean, and sustainable energy supply. These facilities also generate additional revenues that help offset the cost of imported water supplies. The Alvarado and Miramar facilities are currently out of service but will

be evaluated for re-operation under the 2012 Regional Water Facilities Optimization and Master Plan Update. The Rancho Peñasquitos facility has been in continuous operation since 2006 and typically generates enough power to meet the needs of nearly 5,000 county households. The Water Authority's Olivenhain-Hodges facility will provide the region with 40 megawatts (MW) of energy storage, making this power supply available to meet peak demands during high energy use periods. A listing of the Water Authority's hydroelectric facilities is presented in Table 1-5.

**Table 1-5. Water Authority Hydroelectric Facilities**

<b>Hydroelectric Facilities</b>	<b>Rated Output (MW)</b>
Alvarado (currently out of service)	2.0
Miramar (currently out of service)	0.8
Rancho Peñasquitos	4.5
Olivenhain-Hodges Pumped Storage <sup>1</sup>	40.0
<b>Total Rated Output</b>	<b>47.3</b>

<sup>1</sup> Under Construction

## 1.6.6 2012 Regional Water Facilities Optimization and Master Plan

The 2012 Regional Water Facilities Optimization and Master Plan will update the supply and infrastructure development concepts previously proposed under the Water Authority's initial 2002 Master Plan document, which was finalized in 2003. This initial plan has served as the principal guide for all new facilities implemented by the Water Authority, including the Twin Oaks WTP, the expansion of San Vicente Reservoir to provide carryover storage, recent increases to aqueduct system capacity, and the completion of high-priority pipeline relining projects. For the 2012 Master Plan, prevailing themes will center on (1) optimizing existing regional conveyance, treatment, and storage facilities; (2) matching new infrastructure needs with the water demand and supply projections included in the 2010 Plan; and (3) developing a project prioritization strategy that assures timely and cost effective project implementation through a 2035 planning horizon. Update of the 2012 Plan has been initiated and completion is anticipated at the end of 2012.

## 1.7 Service Area Characteristics

The Water Authority's service area characteristics have undergone significant changes over the last several decades. Driven by an average annual population increase of 50,000 people per year, large swaths of rural land were shifted to urban uses to accommodate the growth in population. This shift in land use has resulted in the region's prominent urban and suburban character. San Diego County also has a rich history of agriculture, beginning with the large cattle ranches established in the 18<sup>th</sup> century and continuing through the diverse range of crops and products grown today. Although the total number of agricultural acres under production has declined, the region maintains a significant number of high value crops, such as cut-flowers, ornamental trees and shrubs, nursery plants, avocados, and citrus. Based on the 2009 Crop Statistics and Annual Report by the San Diego County Department of Agricultural Weights and Measures, the region has 6,687 farms – more than any other county in the nation. San Diego County agriculture is a \$1.5 billion dollar per year industry,

and ranks first in the state in gross value of agricultural production for flowers, foliage, and nursery products.

### **1.7.1 Regional Economy and Demographics**

San Diego's economy was subject to two nationwide recessions in the past ten years. First, by a mild recession in 2001 – the aftermath of the dotcom bubble in which many traditional business models were abandoned in favor of business expansion before profitability. This unsustainable business approach resulted in the failure of numerous internet companies and ultimately caused the NASDAQ Composite Index to lose 78 percent of its value.

In late-2007, the national economy plunged into another recession driven by the collapse of large financial institutions, the bailout of banks by the federal government, and a downturn in the housing market. This second recession had more severe and sustained impacts on the local economy, which included reduced home prices, elevated foreclosure rates, and higher job losses. Although June 2009 marked the official end of the recession, its lingering effects are still evident in the diminished number of new housing permits issued in 2010 and double-digit unemployment rate.

However, the San Diego region has shown some resilience in part due to defense-related spending. As the home of the largest concentration of U.S. military forces in the world, San Diego has reaped the leveling effect that Defense Department spending has on undulating economic cycles. Pentagon spending is estimated to pump over \$17 billion into the local San Diego economy. In the private sector, San Diego also saw the largest employment growth of the state's main biomedical clusters. Despite the economic recession, San Diego's biomedical sector experienced a 2.5 percent increase in jobs – expanding faster than the San Francisco Bay Area or Los Angeles County.

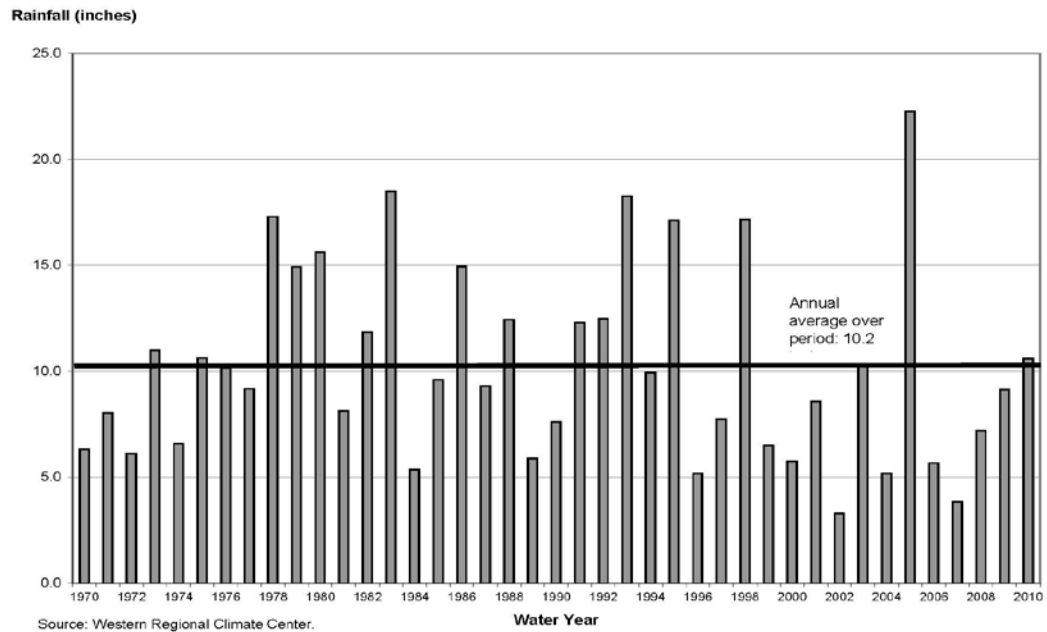
### **1.7.2 Climate**

Climatic conditions within the county area are characteristically Mediterranean along the coast, with mild temperatures year-round. Inland area weather patterns are more extreme, with summer temperatures often exceeding 90 degrees Fahrenheit (°F) and winter temperatures occasionally dipping below freezing. Average annual rainfall is approximately 10 inches per year on the coast and in excess of 33 inches per year in the inland mountains. More than 80 percent of the region's rainfall occurs between December and March.

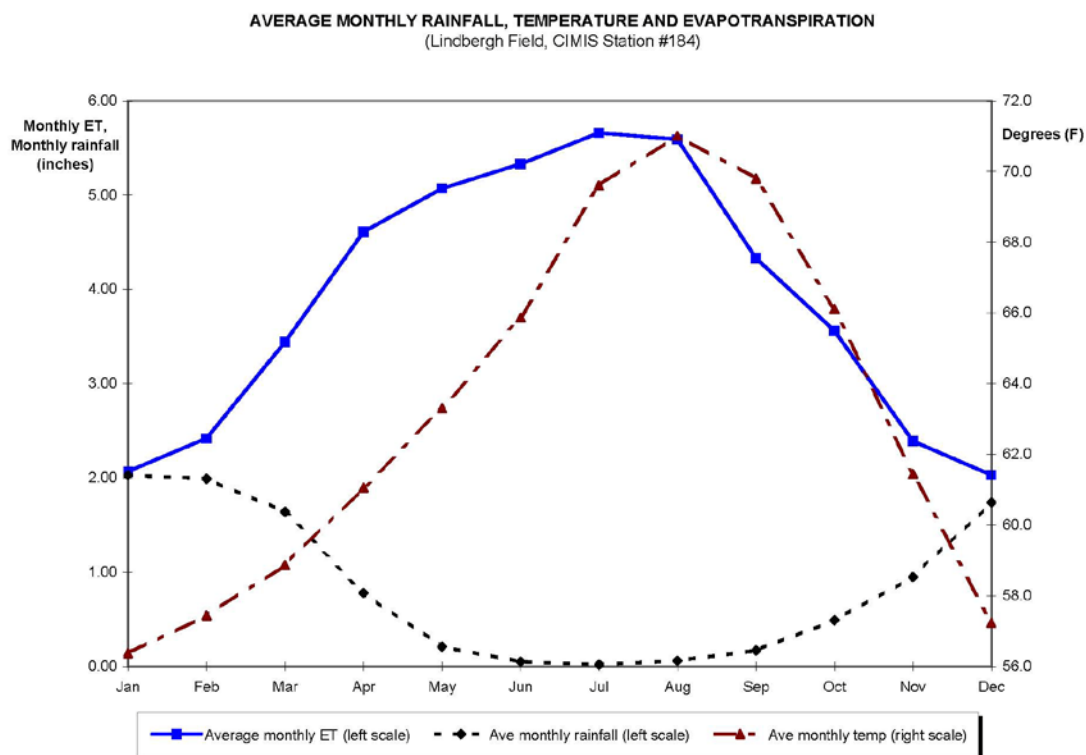
Variations in weather patterns affect regional short-term water requirements, causing reductions in water use during wet cycles and demand spikes during hot, dry periods. Over the last seven years, San Diego has experienced the latter event. Since 1999, local rainfall exceeded the historic annual average only twice (Figure 1-2). These predominantly dry conditions resulted in record level demands during fiscal year 2004, with total local and imported water use surpassing 715,700 AF. With record rainfall in fiscal year 2005, total demands decreased to 642,152 AF. On a monthly basis, water requirements tend to increase during the summer months when a decrease in rainfall combines with an increase in temperatures and an increase in evapotranspiration levels (Figure 1-3).

**Figure 1-2**

**LINDBERGH FIELD  
ANNUAL RAINFALL  
WATER YEARS 1970-2010**



**Figure 1-3**  
**Average Monthly Variables**



### 1.7.3 Climate Change Research Efforts and Greenhouse Gas Mitigation

This section discusses the Water Authority's efforts with regard to studies and research on climate change as well as greenhouse gas mitigation measures. The Scenario Planning process outlined in **Section 10** deals with adapting to potential supply and demand impacts due to climate change. Climate change has become an increasingly important issue to water utilities and both the state and federal legislators. Changes in weather patterns which deviate from historical cycles could significantly affect water supply planning. Irrespective of the debate associated with the sources and cause of increasing concentrations of greenhouse gasses (GHGs), research identifies potential future risks to water resources. The Water Authority recognizes the importance of adapting to climate change and being a leader in sustainability and stewardship. Since 2008, the Water Authority's business plan has included its Climate Change & Sustainability Program within the core business area. The key issues identified within this program include advocating for improvement in modeling to provide precipitation data on a local and regional scale, encouraging focused scientific research on climate change to identify the impacts on the region's water supply, and partnering with other water utilities to incorporate the impacts of climate change on water supply planning and the

development of decision support tools. The Water Authority recognizes the challenges that climate change poses to our region and is committed to proactively addressing the issue.

### **1.7.3.1 San Diego County Water Authority's Activities Related to Climate Change Concerns**

#### **Knowledge Sharing and Research Support**

The Water Authority is an active and founding member of the Water Utility Climate Alliance (WUCA). WUCA consists of ten of the nation's largest water providers collaborating on climate change adaptation and GHG mitigation issues. As part of this effort, WUCA pursues a variety of activities on multiple fronts. WUCA monitors development of climate change-related research, technology, programs, and federal legislation. Activities to date include such things as:

- Letter of support for Western Water Assessment's continued funding as a Regional Integrated Sciences and Assessments team under the National Oceanic and Atmospheric Administration (NOAA)
- Letter of support for the 2009 Kerry-Boxer Water Utilities Mitigation and Adaptation Partnerships congressional bill addendum
- Regular communication and consultations with federal agencies on the U.S. Environmental Protection Agency's Climate Ready Water Utility Working Group
- NOAA Climate Service and January 2010 International Climate Change Forum

In addition to supporting federal and regional efforts, WUCA released a white paper entitled "Options for Improving Climate Modeling to Assist Water Utility Planning for Climate Change" in January 2010. The purpose of the paper was to assess Global Circulation Models, identify key aspects for water utility planning, and make seven initial recommendations for how climate modeling and downscaling techniques can be improved so that these tools and techniques can be more useful for the water sector.

To address water provider-specific needs, WUCA focused on how best to incorporate knowledge from the above white paper into water planning, which was more thoroughly explored in a second white paper also released January 2010 entitled "Decision Support Planning Methods: Incorporating Climate Change Uncertainties into Water Planning." This paper assessed five known decision support tools for applicability in incorporating climate change uncertainty in water utility planning and identified additional research needs in the area of decision support methodologies. The Water Authority utilized and modified one of these decision support tools, "Scenario Planning" in its long-range planning for the 2010 Plan, which was the basis of Section 10, "Scenario Planning: Managing an Uncertain Future," below.

The Water Authority and the other member agencies of WUCA annually share individual agency actions to mitigate GHG emissions to facilitate further implementation of these programs. At a September 2009 summit at the Aspen Global Change Institute, WUCA members met with global climate modelers, along with federal agencies, academic scientists, and climate researchers to establish collaborative directions to progress climate science and modeling efforts. The Water Authority, through its membership with WUCA, continues to pursue these opportunities and partnerships with other water providers, climate scientists, federal agencies, research centers, academia, and key stakeholders.

## Planned Research

The Water Authority in cooperation with the Scripps Institution of Oceanography and San Diego State University, and with partial funding from the Blasker Environmental Fund at the San Diego Foundation began a project in 2010 to better understand the uncertainties of climate change and the influence climate change may have on water supply and demand for the San Diego Region. This project will (a) provide a better understanding of the range of uncertainties of climate change and the influence that climate change will have on water supply and demand for the region, (b) improve the quantification of the likely availability of water supplies from the Sierra Nevada, (c) narrow the range of uncertainty of the impacts on the Colorado River basin and the reduction of flows under a range of climate change scenarios in the region, and (d) result in the development of municipal and rural demand models to include climatic influences – including higher temperatures, greater evaporative losses, storm-time conditions and hydrologic response – along with the evaluation of social and economic impacts of changing demand and supply in the region.

## Implementation of Programs and Policies

The Water Authority has made great efforts to implement GHG mitigation programs and policies for its facilities and operations. To date, these programs and policies have focused on the following:

- Exploring water supply/energy relationships and opportunities to increase efficiencies to lower GHG emissions
- Joining the Climate Registry; the Water Authority is currently developing its baseline GHG inventory from calendar year 2009
- Reducing the number of vehicles in the fleet and replacing vehicles with hybrids when possible
- Developing solar power at three Water Authority sites, including the Twin Oaks Valley Water Treatment Plant, the Escondido Operations Center, and the San Diego Headquarters

### 1.7.4 Population

When the Water Authority was formed in 1944, the population within its service area was estimated at roughly 260,000 people. By 2010, Water Authority service area population reached 3.2 million, or an approximate 12-fold increase. The city of San Diego represents the largest population of any member agency, with just under 1.4 million people. The Yuima Municipal Water District has the smallest population, at approximately 1,500 people. The average population density in 2010 was 3.0 per acre, with National City having the highest density (12.0 per acre) and Yuima Municipal Water District the lowest (0.1 per acre).

The population of San Diego County is projected to increase by 844,800 people between 2010 and 2035, for a total county population in excess of 4.0 million. This change represents an average annual increase of about 33,800 people, or roughly 1.1 percent annually. These regional growth projections are based on the San Diego Association of Governments (SANDAG) 2050 Regional Growth Forecast, adopted by its Board on February 26, 2010.

Water Authority service area population projections are also based on SANDAG's 2050 Regional Growth Forecast and are presented in Table 1-6. Water Authority member agencies are projected to have varying future growth. Some, such as the Santa Fe Irrigation District and the city of Del Mar, are expected to experience relatively modest growth. Others, including the Otay Water District and the city of San Diego, anticipate sizeable increases in both population and water demand.



**Table 1-6. Water Authority Service Area Population Forecast (2015–2035)**

<b>Year</b>	<b>Population</b>
2015	3,271,773
2020	3,438,837
2025	3,599,952
2030	3,758,933
2035	3,906,718
Average Annual Growth	31,747

Source: SANDAG 2050 Regional Growth Forecast